What is claimed is:

1. A method for determining a glucose concentration of a blood sample, comprising the steps of:
   a) applying a signal having an AC component to the blood sample;
   b) measuring an AC phase angle response to the signal; and
   c) determining the glucose concentration using the AC phase angle response.

2. The method of claim 1, wherein step (c) comprises determining an effective phase angle, which is proportional to the glucose concentration, using the AC phase angle response.

3. The method of claim 2, wherein step (c) comprises determining the effective phase angle using

$$P_{eff} = (\Phi / \Gamma)^{-\gamma}$$

Where: P_{eff} is the effective phase angle,

Φ is the AC phase angle response, and

Γ and γ are constants.

4. The method of claim 1, wherein step (a) comprises applying a signal having a frequency of 2kHz or below.

5. The method of claim 1, wherein step (a) comprises applying a signal having a frequency of 1kHz or below.

6. The method of claim 1, wherein step (a) comprises applying a signal having a frequency of 200Hz or below.

7. The method of claim 2, wherein step (c) further comprises determining the glucose concentration using

$$PRED = (a_0 + hct_1H_{est} + hct_2H_{est}^2 + tau_1dT + tau_2dT^2) + (a_1P_{eff})(1 + hct_3H_{est} + hct_4H_{est}^2)(1 + tau_3dT + tau_4dT^2)$$

Where: PRED is the glucose concentration,

P_{eff} is the effective phase angle,

a_o, a_1, hct, hct_2, hct_3, hct_4, tau_1, tau_2, tau_3 and tau_4 are constants,

H_{est} is a hematocrit value of the blood sample, and

dT is the temperature

8. The method of claim 3, wherein step (a) comprises applying a signal having a frequency of 2kHz or below.

9. The method of claim 1, wherein the signal is an AC signal.

10. The method of claim 1, wherein the AC component of the signal has a frequency not less than 1 Hz and not greater than 20kHz.

11. A method of determining a glucose concentration of a biological fluid sample, comprising:
    (a) applying a signal having an AC component to the sample;
    (b) measuring an AC phase angle response to the signal; and
    (c) determining the glucose concentration based upon the AC phase angle response and a predetermined correlation between the AC phase angle response and the glucose concentration.

12. The method of claim 11, wherein the biological fluid is blood.

13. The method of claim 12, wherein step (c) comprises determining an effective phase angle, which is proportional to the glucose concentration, using the AC phase angle response.

14. The method of claim 13, wherein step (c) comprises determining the effective phase angle using

$$P_{eff} = (\Phi / \Gamma)^{-\gamma}$$

Where: P_{eff} is the effective phase angle,

Φ is the AC phase angle response, and

Γ and γ are constants.

15. The method of claim 11, wherein step (a) comprises applying a signal having a frequency of 2kHz or below.

16. The method of claim 11, wherein step (a) comprises applying a signal having a frequency of 1kHz or below.

17. The method of claim 11, wherein step (a) comprises applying a signal having a frequency of 200Hz or below.

18. The method of claim 13, wherein step (c) further comprises determining the glucose concentration using

$$\mathrm{PRED} = (a_0 + \mathrm{hct}_1 H_{est} + \mathrm{hct}_2 H_{est}^2 + \mathrm{tau}_1 dT + \mathrm{tau}_2 dT^2)$$
$$+ (a_1 P_{eff})(1 + \mathrm{hct}_3 H_{est} + \mathrm{hct}_4 H_{est}^2)(1 + \mathrm{tau}_3 dT + \mathrm{tau}_4 dT^2)$$

Where: PRED is the glucose concentration,

P_{eff} is the effective phase angle,

a_o, a_1, hct, hct_2, hct_3, hct_4, tau_1, tau_2, tau_3 and tau_4 are constants,

H_{est} is a hematocrit value of the blood sample, and

dT is the temperature

19. The method of claim 14, wherein step (a) comprises applying a signal having a frequency of 2kHz or below.

20. The method of claim 11, wherein the signal is an AC signal.

21. The method of claim 11, wherein the AC component of the signal has a frequency not less than 1 Hz and not greater than 20kHz.

22. A method of determining a glucose concentration of a test sample comprising:
    (a) applying a signal having an AC component to the sample;
    (b) measuring an AC phase angle response to the signal; and
    (c) determining the glucose concentration using the first AC phase angle response and a predetermined compensation factor.

23. The method of claim 22, wherein the predetermined compensation factor accounts for a test sample temperature.

24. The method of claim 22, wherein the test sample is blood.

25. The method of claim 24, wherein the predetermined compensation factor accounts for a test sample hematocrit value.

26. The method of claim 24, wherein the predetermined compensation factor accounts for a test sample temperature and a test sample hematocrit value.

27. The method of claim 24, wherein step (c) comprises determining an effective phase angle, which is proportional to the glucose concentration, using the AC phase angle response.

28. The method of claim 27, wherein step (c) comprises determining the effective phase angle using

$$P_{eff} = (\Phi / \Gamma)^{-\gamma}$$

Where: P_{eff} is the effective phase angle,

Φ is the AC phase angle response, and

Γ and γ are constants.

29. The method of claim 22, wherein step (a) comprises applying a signal having a frequency of 2kHz or below.

30. The method of claim 22, wherein step (a) comprises applying a signal having a frequency of 1kHz or below.

31. The method of claim 22, wherein step (a) comprises applying a signal having a frequency of 200Hz or below.

32. The method of claim 27, wherein step (c) further comprises determining the glucose concentration using

$PRED = (a_0 + hct_1 H_{est} + hct_2 H_{est}^2 + tau_1 dT + tau_2 dT^2)$
$+ (a_1 P_{eff})(1 + hct_3 H_{est} + hct_4 H_{est}^2)(1 + tau_3 dT + tau_4 dT^2)$

Where: PRED is the glucose concentration,
P_{eff} is the effective phase angle,
a_o, a_1, hct, hct_2, hct_3, hct_4, tau_1, tau_2, tau_3 and tau_4 are constants,
H_{est} is a hematocrit value of the blood sample, and
dT is the temperature

33. The method of claim 28, wherein step (a) comprises applying a signal having a frequency of 2kHz or below.

34. The method of claim 22, wherein the signal is an AC signal.

35. The method of claim 22, wherein the AC component of the signal has a frequency not less than 1 Hz and not greater than 20kHz.

36. A method for determining a hematocrit value of a blood sample, comprising the steps of:

a) applying at least one signal having an AC component to the blood sample;

b) measuring at least one AC phase angle response to respective ones of the at least one signal; and

c) determining the hematocrit value using the at least one AC phase angle response.

37. The method of claim 36, wherein said at least one signal comprises at least two frequencies.

38. The method of claim 36, wherein said at least one signal comprises at least four frequencies.

39. The method of claim 37, wherein said at least two frequencies are applied at least partially simultaneously.

40. The method of claim 38, wherein said at least four frequencies are applied at least partially simultaneously.

41. The method of claim 36, wherein said at least one signal comprises n signals, and wherein step (c) comprises determining the hematocrit value using

$H_{est} = c_0 + c_1\Phi_1 \ldots c_n\Phi_n$

Where: H_{est} is the hematocrit value,

$c_0, c_1 \ldots c_n$ are constants, and

$\Phi_1 \ldots \Phi_n$ are respective AC phase angle responses to each of the n signals.

42. A method for determining a hematocrit value of a blood sample, comprising the steps of:

(a) applying a first signal having an AC component to the blood sample, the first signal having a first frequency;

(b) measuring a first AC phase angle response to the first signal;

(c) applying a second signal having an AC component to the blood sample, the second signal having a second frequency;

(d) measuring a second AC phase angle response to the second signal; and

(e) determining the hematocrit value based at least in part upon the first phase angle response and the second phase angle response.

43. The method of claim 42, further comprising the steps of:

(f) applying a third signal having an AC component to the blood sample, the third signal having a third frequency;

(g) measuring a third AC phase angle response to the third signal;

(h) applying a fourth signal having an AC component to the blood sample, the fourth signal having a fourth frequency; and

(i) measuring a fourth AC phase angle response to the fourth signal;

(j) wherein the determining the hematocrit value is further based upon the third phase angle response and the fourth phase angle response.

44. The method of claim 42 wherein the first frequency is about 10 kHz and the second frequency is about 20 kHz.

45. The method of claim 43 wherein the third frequency is about 2 kHz and the fourth frequency is about 1 kHz.

46. The method of claim 42, wherein the first frequency and the second frequency are applied at least partially simultaneously.

47. The method of claim 43, wherein the first frequency, the second frequency, the third frequency and the fourth frequency are applied at least partially simultaneously.

48. The method of claim 43, wherein step (j) comprises determining the hematocrit value using

$H_{est} = c_0 + c_1\Phi_1 + c_2\Phi_2 + c_3\Phi_3 + c_4\Phi_4$

Where: H_{est} is the hematocrit value,

c_0, c_1, c_2, c_3, c_4 are constants, and

$\Phi_1, \Phi_2, \Phi_3, \Phi_4$ are respective AC phase angle responses to the first, second, third and fourth signals.